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Field Guide for

EVALUATING COTTONWOOD SITES

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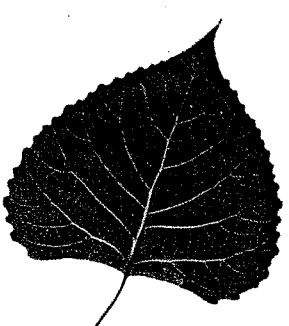

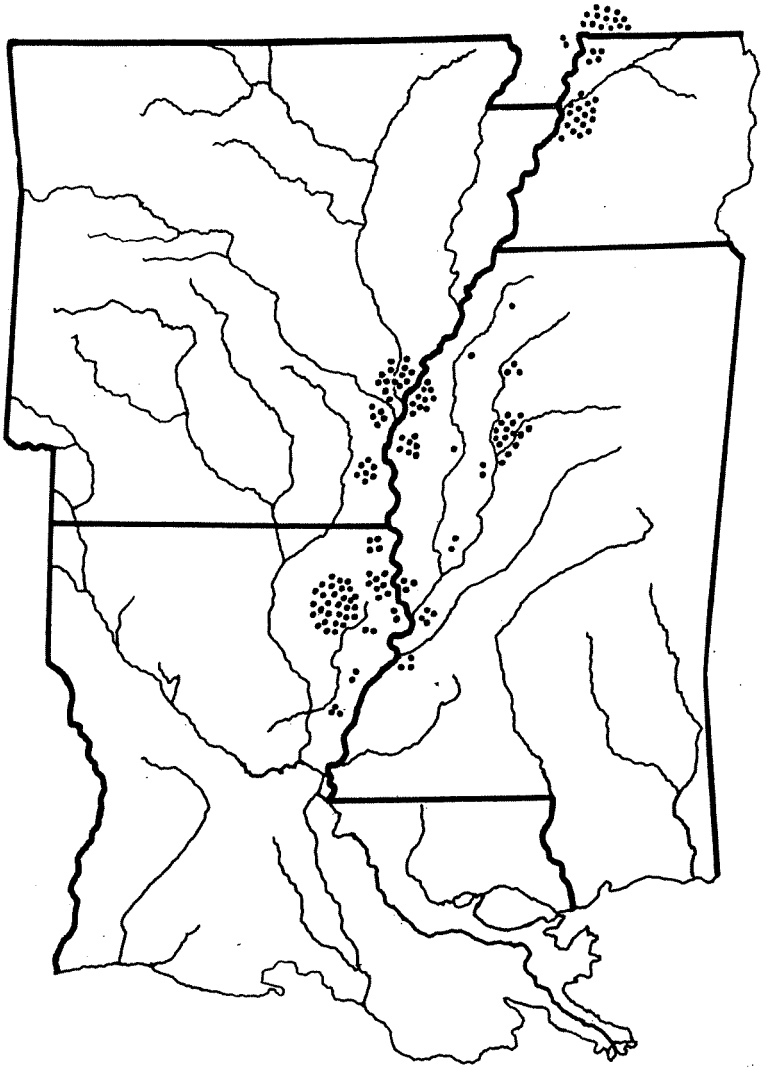

Figure 1.—*Location of cottonwood sample plots.*

Two field methods have been developed at the Stoneville Research Center[1] for estimating the capability of Midsouth soils to grow eastern cottonwood *(Populus deltoides* Bartr.). Data for establishing the procedures were collected from 155 plots[2] at the locations indicated in Figure 1.

The methods give site index—that is, tree-growing potential—in terms of the height, in feet, that free-growing cottonwoods in well-stocked forest stands will reach at the age of 30 years. While 50 years is the customary age for expressing site index, 30 years was chosen because it is close to the average for the stands from which data were secured and because most cottonwood trees are log size by 30 years.

The first method provides a fast field classification of sites from determinations of soil texture, internal drainage, and inherent moisture conditions.

The second method requires the soil to be identified according to standard soil series and phase.

A weakness of both methods is that they rely heavily upon human judgment. Attempts have been made to predict cottonwood site index from soil variables that can be objectively measured, but the variables initially tested did not prove to be very well correlated with site index. The present subjective methods are offered only until more objective measures can be developed.

METHOD I

The first method is applicable only in the area where the sample plots were measured (fig. 1). It requires use of a soil auger or spade to determine the texture and internal drainage in the surface two feet of soil. The inherent moisture condition of the site can be obtained by observation. After these three components have been established, site index can be read from Figure 2 or keyed out in Table 1.

Texture.—Classify texture of the surface 2 feet as fine, medium, or coarse. Clays (buckshot and gumbo) are classed as fine, sandy soils as coarse, and all the rest as medium. Excessively drained and exceptionally dry sand ridges should be excluded from the coarse class, as they are not recommended for growing cottonwood.

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[1] Maintained at Stoneville, Mississippi, by the Southern Forest Experiment Station in cooperation with the Mississippi Agricultural Experiment Station and the Southern Hardwood Forest Research Group.

[2] Data for 43 plots in northeast Louisiana were furnished by the Soil Conservation Service, U. S. Department of Agriculture.

Internal drainage.—If there is no distinct gray or reddish-brown mottling within the surface 2 feet, classify the site as well drained. If mottling is distinct, classify internal drainage as poor.

Inherent moisture condition.—If the site is on a slope or ridge, or is otherwise situated so that floodwaters or heavy rains drain off, classify it as dry. If it is level, or situated so that it is subject to flooding, classify as moist. Generally, no other classification of inherent moisture is necessary, but sometimes factors like nearness of root zone to mean low water in rivers, reservoirs, streams, or lakes may have to be considered.

Table 1.—*Field key for estimating cottonwood site index*[1]

Soil-site description	Site index
	Feet
I. Fine texture	
A. Good internal drainage	
1. Inherently moist	110-119
2. Inherently dry	100-109
B. Poor internal drainage	
1. Inherently moist	90-99
2. Inherently dry	<90
II. Medium texture	
A. Good internal drainage	
1. Inherently moist	120+
2. Inherently dry	110-119
B. Poor internal drainage	
1. Inherently moist	100-109
2. Inherently dry	90-99
III. Coarse texture	
A. Good internal drainage	
1. Inherently moist	110-119
2. Inherently dry[2]	100-109

[1] Key not applicable to soils outside the Mississippi River flood plain—as loess or Coastal Plain alluvium. Sites not indexed are either nonexistent or are not recommended for cottonwood.

[2] Sand ridges are excluded from this class, as they are too dry for cottonwood.

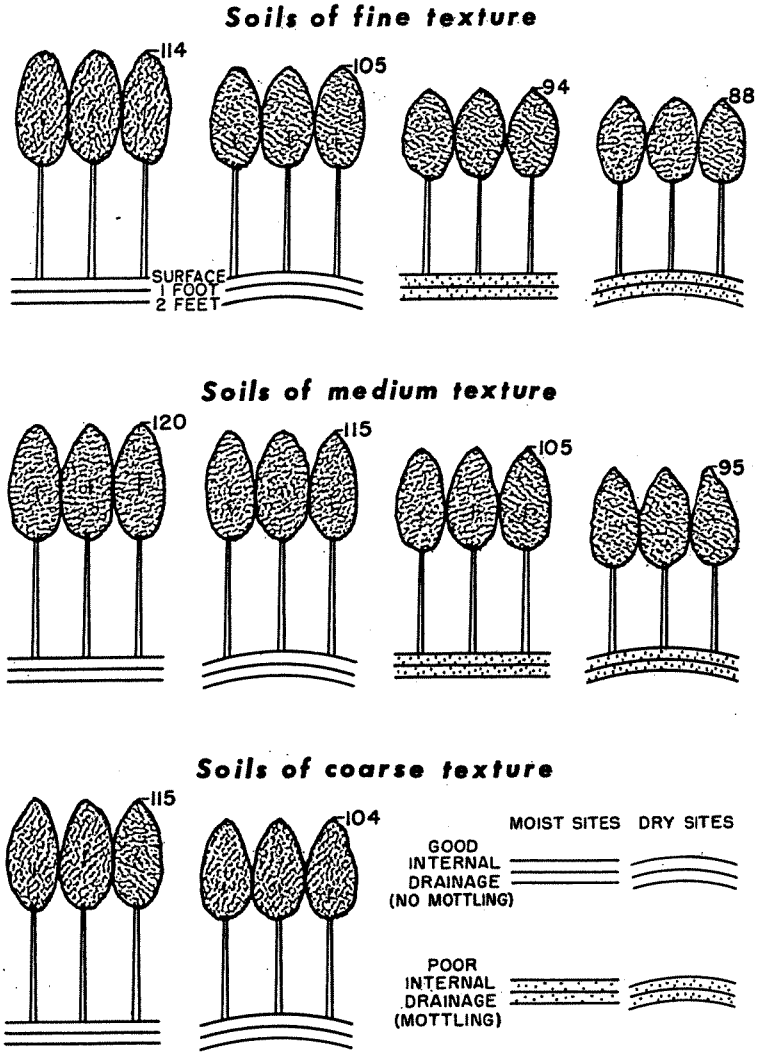

Figure 2.—*Average site index or height of cottonwood at age 30 years, on soils derived from alluvium of the Mississippi River flood plain.*

METHOD II

The second method requires identifying the soil series and its local phase (moist or dry). Identification can be made in the field by any locally competent soil scientist. The quickest way of identifying the soil is from standard soil survey maps, but not all counties have been mapped. Standard soil maps will not show inherent moisture phases, but will show slopes and phases that can be translated into moist or dry phases by the procedure outlined in Method I.

With soil series and phase determined, the estimate of cottonwood site index can be obtained from Table 2.

Table 2.—*Site index of cottonwood, at age 30 years, by soil series and phase*

Soil series	Site index	
	Moist phase	Dry phase
	Feet	*Feet*
Soils of recent natural levees (Mississippi River alluvium)		
Commerce	122	118
Robinsonville	115	105
Crevasse	114	104
Mhoon	114	103
Soils of old natural levees (Mississippi River alluvium)		
Dundee	. . .	93
Forestdale	. . .	90
Soils of slack-water areas (Mississippi River alluvium)		
Bowdre	115	94
Tunica	110	. . .
Sharkey	91	90
Alligator	88	80
Bottom-land soils from loess		
Collins	122	110
Falaya	109	93
Waverly	97	. . .
Arkansas River soils		
Pulaski	113	. . .
Norwood	109	. . .
Perry	95	. . .

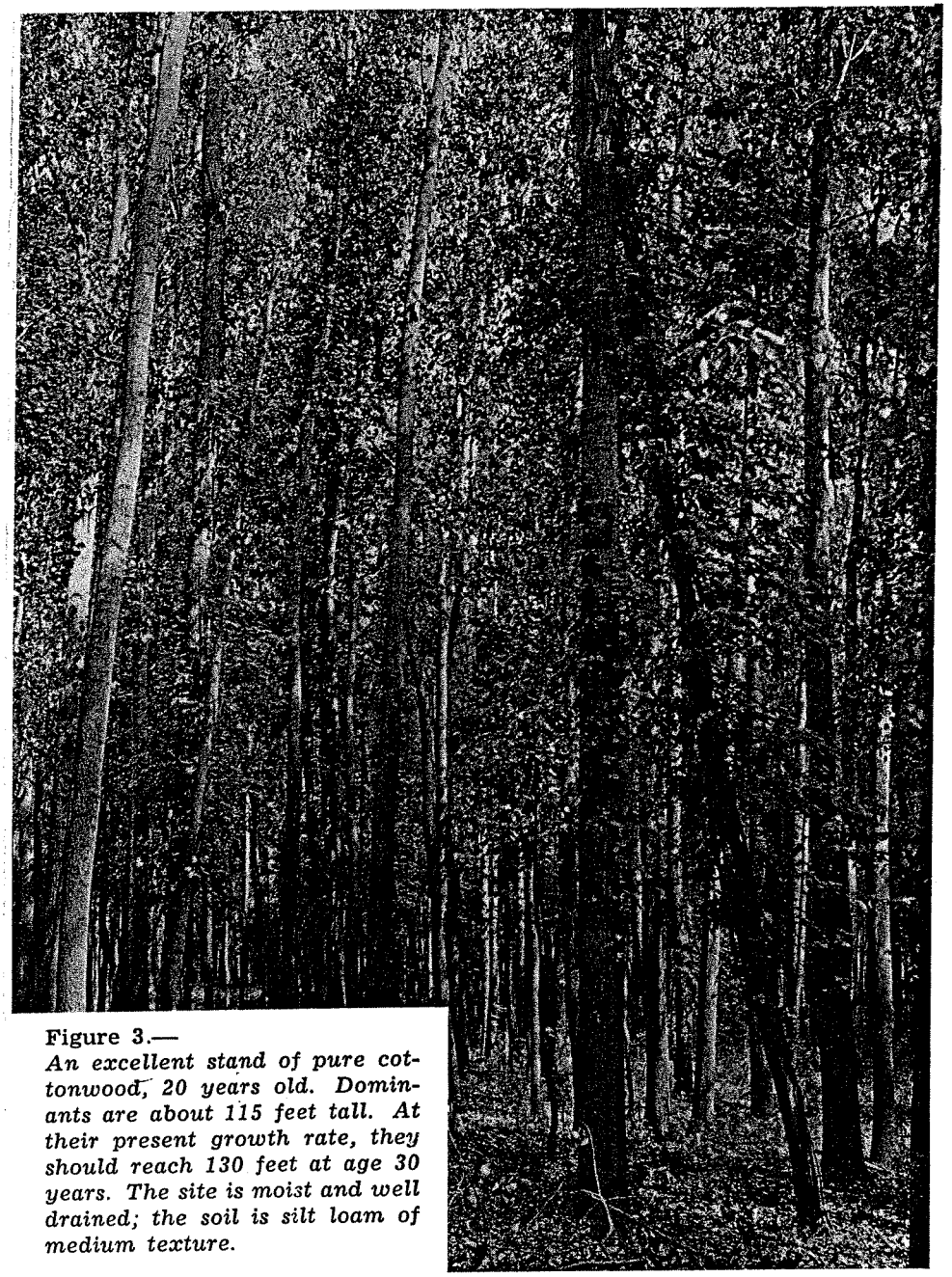

Figure 3.—
An excellent stand of pure cottonwood, 20 years old. Dominants are about 115 feet tall. At their present growth rate, they should reach 130 feet at age 30 years. The site is moist and well drained; the soil is silt loam of medium texture.

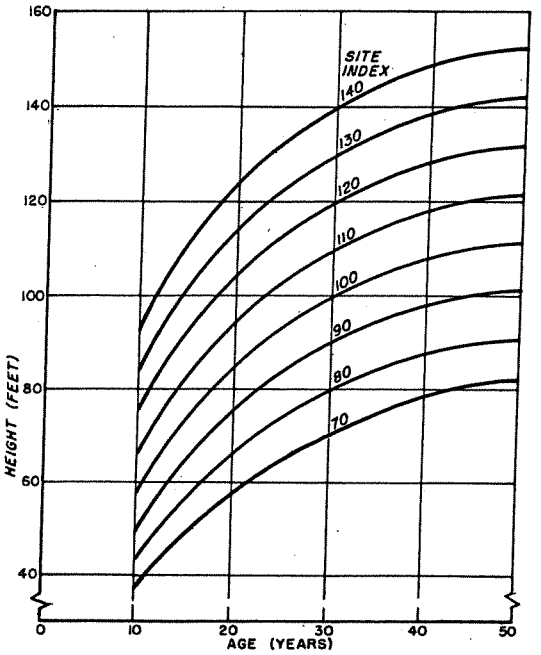

Figure 4.—*These curves indicate the expectable height of cottonwood trees on sites of various quality. They can be used to check the evaluations made by either method. Making a check requires measuring the heights of dominant and codominant trees in well-stocked stands that have had no modifying influence or treatment. For example, trees 100 feet tall at age 20 would signify a site index of 115.*

The curves are based on stem analyses of trees on a wide range of sites; the analyses involved cutting, sectioning, and counting annual rings of tree stems at intervals of 8 feet from a 1-foot stump to the top. The data from the sections were substantiated by plotting tree height over age for the study plots and for several young plantations. Smooth curves were then drawn by eye. These curves apply only to cottonwood in the Midsouth through age 50 years.